

What is claimed is:

- 1 1. Biocompatible particles for delivery of a vaccine to the *pulmonary* system comprising
2 an immunizing agent; wherein the particles have a tap density less than 0.4 g/ml and at
3 least 90% of the particles have geometric dimensions between about 5 μm and about 30
4 μm .
- 1 2. The particles of claim 1 wherein the immunizing agent is selected from the group
2 consisting of a live attenuated virus or bacterial vaccine, a recombinant virus or bacterial
3 vaccine encoding an immunizing antigen or a combination of antigens against which
4 elicitation of an immune response is desired, and an inactivated virus or bacterial vaccine.
- 1 3. The particles of claim 1 combined with large biodegradable carrier particles having a
2 mass mean diameter in the range of about 50 μm to about 100 μm .
- 1 4. The particles of claim 1 combined with a pharmaceutically acceptable carrier for
2 administration to the respiratory tract.
- 1 5. The particles of claim 1 wherein at least 90% of the particles have a mass mean
2 diameter between about 5 μm and about 15 μm .
- 1 6. The particles of claim 1 wherein at least 90% of the particles have a mean diameter
2 between about 9 μm and about 11 μm .
- 1 7. The particles of claim 1 wherein at least 50% of the particles have a tap density of less
2 than 0.1 g/cm³.
- 1 8. The particles of claim 1 wherein the particles further comprise a polymeric material.
- 1 9. The particles of claim 1 wherein the particles further comprise a non-polymeric
2 material.
- 1 10. Biocompatible particles for delivery of a targeting molecule to the *pulmonary* system
2 wherein the targeting molecule is attached to the particles and wherein the particles have

3 a tap density less than 0.4 g/cm.³, and at least 90% of the particles have geometric
4 dimensions between 5 .mu.m and about 30 .mu.m.

1 11. Biocompatible particles for delivery of a vaccine agent to the *pulmonary* system
2 comprising an immunologically effective amount of a vaccine agent; wherein the
3 particles have a tap density less than 0.4 g/cm.³ and at least 90% of the particles have
4 an aerodynamic diameter between about 1 .mu.m and about 5 .mu.m.

1 12. The particles of claim 11 wherein the agent is selected from the group consisting of
2 viral vaccines, bacterial vaccines, live, attenuated, recombinant, inactivated, and
3 combinations thereof.

1 13. The particles of claim 11 combined with large biodegradable carrier particles having
2 a mass mean diameter in the range of about 50 .mu.m to about 100 .mu.m.

1 14. The particles of claim 11 combined with a pharmaceutically acceptable carrier for
2 administration to the respiratory tract.

1 15. The particles of claim 11 wherein at least 90% of the particles have an aerodynamic
2 diameter between about 1 .mu.m and about 3 .mu.m.

1 16. The particles of claim 11 wherein at least 90% of the particles have an aerodynamic
2 diameter between about 3 .mu.m and about 5 .mu.m.

1 17. The particles of claim 11 wherein at least 50% of the particles have a tap density of
2 less than 0.1 g/cm.³.

1 18. The particles of claim 11 wherein the particles further comprise a polymeric material.

1 19. The particles of claim 11 wherein the particles further comprise a non-polymeric
2 material.

1 20. Biocompatible particles for delivery of a vaccine and targeting molecule to the
2 *pulmonary* system wherein the targeting molecule is attached to the particles and wherein
3 the particles have a tap density less than 0.4 g/cm.³, and at least 90% of the particles
4 have an aerodynamic diameter between about 1 .mu.m and about 5 .mu.m.

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- 1 21. A method for delivery of an actively immunizing amount of a vaccine to the
2 *pulmonary* system comprising: administering to the respiratory tract of a patient in need
3 thereof of an effective amount of biocompatible particles incorporating said vaccine,
4 wherein the particles have a tap density of less than about 0.4 g/cm.³ and at least
5 90% of the particles have geometric dimensions between about 5 .mu.m and about 30
6 .mu.m.
- 1 22. The method of claim 21 wherein the agent is selected from the group consisting of
2 viral vaccines, bacterial vaccines, live, attenuated, recombinant, inactivated, and
3 combinations thereof.
- 1 23. The method of claim 21 wherein the particles are combined with large biodegradable
2 carrier particles having a mass mean diameter in the range of about 50 .mu.m to about
3 100 .mu.m.
- 1 24. The method of claim 21 wherein the particles are combined with a pharmaceutically
2 acceptable carrier for administration to the respiratory tract.
- 1 25. The method of claim 21 wherein at least 90% of the particles have a mass mean
2 diameter between about 5 .mu.m and about 15 .mu.m.
- 1 26. The method of claim 21 for delivery to the alveolar zone of the lung wherein at least
2 90% of the particles have a mean diameter between about 9 and about 11 .mu.m.
- 1 27. The method of claim 21 wherein at least 50% of the administered particles have a tap
2 density of less than about 0.1 g/cm.³.
- 1 28. The method of claim 21 wherein the particles further comprise a polymeric material.
- 1 29. The method of claim 21 wherein the particles further comprise a non-polymeric
2 material.
- 1 30. A method for delivery of a vaccine and a targeting molecule to the *pulmonary* system
2 comprising: administering to the respiratory tract of a patient in need of treatment,
3 prophylaxis or diagnosis an effective amount of biocompatible particles, wherein the
4 particles have a tap density less than about 0.4 g/cm.³ and at least 90% of the
5 particles have geometric dimensions between about 5 .mu.m and about 30 .mu.m, and

6 wherein the targeting molecule is attached to the particles which further comprise the
7 vaccine.

1 31. A method for delivery of a vaccine to the *pulmonary* system comprising:
2 administering to the respiratory tract of a patient in need thereof of an effective amount of
3 biocompatible particles comprising said vaccine, wherein the particles have a tap density
4 of less than about 0.4 g/cm.³ and at least 90% of the particles have an aerodynamic
5 diameter between about 1 . μ m and about 5 . μ m.

1 32. The method of claim 31 wherein the agent is selected from the group consisting of
2 viral vaccines, bacterial vaccines, live, attenuated, recombinant, inactivated, and
3 combinations thereof.

1 33. The method of claim 31 wherein the particles are combined with large biodegradable
2 carrier particles having a mass mean diameter in the range of about 50 . μ m to about
3 100 . μ m.

1 34. The method of claim 31 wherein the particles are combined with a pharmaceutically
2 acceptable carrier for administration to the respiratory tract.

1 35. The method of claim 31 wherein at least 90% of the particles have an aerodynamic
2 diameter between about 1 . μ m and about 3 . μ m.

1 36. The method of claim 31 for delivery to the alveolar zone of the lung wherein at least
2 90% of the particles have an aerodynamic diameter between about 3 . μ m and about 5
3 . μ m.

1 37. The method of claim 31 wherein at least 50% of the administered particles have a tap
2 density of less than about 0.1 g/cm.³.

1 38. The method of claim 31 wherein the particles further comprise a polymeric material.

1 39. The method of claim 31 wherein the particles further comprise a non-polymeric
2 material.

1 40. A method for delivery of a vaccine and a targeting molecule to the *pulmonary* system
2 comprising: administering to the respiratory tract of a patient in need of treatment,
3 prophylaxis or diagnosis an effective amount of biocompatible particles comprising said

- 4 vaccine, wherein the particles have a tap density less than about 0.4 g/cm.³ and at
5 least 90% of the particles have an aerodynamic diameter between about 1 .mu.m and
6 about 5 .mu.m, and wherein the targeting molecule is attached to the particles.

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